

Claims

- 5 1. A structure of a radio frequency front end comprising as functional units an antenna and at least one bandpass filter and at least one amplifier, in which front end active and passive component parts have been integrated, the structure further comprising
- an antenna circuit board on a first surface of which there is at least one radiating element and on a second surface of which there is a conductive plane,
 - a second circuit board by which said at least one filter and at least one amplifier are supported, and one surface of which is conductive,
 - 10 - a protective frame such that the antenna circuit board, the second circuit board and the protective frame form a substantially closed space, wherein
 - the antenna circuit board, the second circuit board with attached units and the protective frame form a single solid component, and
 - 15 - the distance between the second circuit board and the antenna circuit board in said component is substantially smaller than a quarter of a wavelength corresponding to any operation frequency of said front end.
- 20 2. The structure of claim 1, comprising both a transmit and a receive branch, said functional units being a duplex filter, a low-noise amplifier and a receive filter, a transmit filter and a power amplifier, and a directional coupler.
3. The structure of claim 1, comprising both a transmit and a receive branch, said functional units being an antenna filter and antenna switch, a low-noise amplifier and a receive filter, a transmit filter and a power amplifier, and a directional coupler.
- 25 4. The structure of claim 2 or 3, said functional units further being at least a transmit branch mixer, a receive branch mixer, a modulator, a demodulator and filters associated with these.
5. The structure of claim 1, said antenna being a multi-frequency antenna having at least two radiating elements on the antenna circuit board.
- 30 6. A communications apparatus having a radio-frequency front end, which comprises
- an antenna circuit board on a first surface of which there are radiating elements of an antenna of the communications apparatus and on a second surface of which there

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is a conductive plane,

- a second circuit board by which functional units of said front end are supported, and one surface of which is conductive,

5 - a protective frame such that the antenna circuit board, the second circuit board and the protective frame form a substantially closed space, wherein

- the antenna circuit board, the second circuit board with attached units and the protective frame form a single solid component, and

10 - the distance between the second circuit board and the antenna circuit board in said component is substantially smaller than a quarter of a wavelength corresponding to any operation frequency of said front end, and

- said component is completely inside covers of the communications apparatus.

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